

CLAIMS

I/We claim:

- [c1] 1. An acoustical system, comprising:
 - a substrate having a plurality of conductive paths, the substrate being operatively couplable to an output device; and
 - a plurality of acoustical transducers carried by the substrate and positioned to form an array having at least one dimension, the acoustical transducers being configured to sense sound and to transmit input signals to the substrate, the substrate being configured to receive the input signals and to transmit at least one output signal to the output device.
- [c2] 2. The system of claim 1 wherein the substrate includes a circuit board.
- [c3] 3. The system of claim 1 wherein the acoustical transducers include microphones.
- [c4] 4. The system of claim 1 wherein the output device includes a recorder.
- [c5] 5. The system of claim 1 wherein the output device includes a computer processor.
- [c6] 6. The system of claim 1 wherein the substrate is configured to transmit an output signal that is at least approximately the same as at least one of the input signals.
- [c7] 7. The system of claim 1 wherein the substrate is generally self-supporting.

- [c8] 8. The system of claim 1 wherein the plurality of acoustical transducers includes at least one acoustical transducer configured to sense sound and at least one acoustical transducer configured to transmit sound.
- [c9] 9. The system of claim 1 wherein at least one of the plurality of acoustical transducers carried by the substrate is further configured to transmit sound.
- [c10] 10. The system of claim 1 wherein the substrate includes a connector coupled to at least one of the conductive paths and wherein at least one of the acoustical transducers is coupled to the connector.
- [c11] 11. The system of claim 1 wherein the substrate includes a first substrate, and wherein the system further comprises at least one second substrate, with the first substrate being operatively coupleable to the output device via the at least one second substrate.
- [c12] 12. The system of claim 1 wherein the substrate is operatively coupleable to the output device via at least one cable.
- [c13] 13. The system of claim 1 wherein the substrate further includes a processing device coupled to at least one of the conductive paths and at least one of the acoustical transducers to process an input signal from the at least one acoustical transducer.
- [c14] 14. The system of claim 1 wherein the substrate further includes a processing device coupled to at least one of the conductive paths and at least one of the acoustical transducers to digitize an input signal from the at least one acoustical transducer.

- [c15] 15. The system of claim 1 wherein the substrate includes at least one of a resistor and a capacitor.
- [c16] 16. The system of claim 1 wherein the plurality of conductive paths includes at least one first conductive path and at least one second conductive path, the at least one first conductive path being configured to carry at least one of the input and output signals, and the at least one second conductive path being coupled to ground and located proximate to the at least one first conductive path to shield the first conductive path.
- [c17] 17. The system of claim 1, further comprising a vehicle having an interior, the substrate and the acoustical transducers being positioned in the interior.
- [c18] 18. The system of claim 1, further comprising a vehicle having an interior, the substrate and the acoustical transducers being positioned in the interior, and wherein the acoustical transducers are positioned to sense noise produced by at least one of the vehicle and an environment surrounding the vehicle.
- [c19] 19. An acoustical system, comprising:
a first substrate having a plurality of conductive paths, the first substrate being operatively coupleable to an output device;
at least one first acoustical transducer carried by the first substrate, the at least one first acoustical transducer being configured to sense sound and to transmit a first input signal to the first substrate, the first substrate being configured to receive the first input signal and to transmit a first output signal to the output device;
at least one second substrate having a plurality of conductive paths, the second substrate being operatively coupleable to the output device or another output device; and

at least one second acoustical transducer carried by the at least one second substrate, the at least one second acoustical transducer being configured to sense sound and to transmit a second input signal to the at least one second substrate, the at least one second substrate being configured to transmit a second output signal to the output device or the other output device, and the first and second substrates being coupled together to position the first and second acoustical transducers in an array having at least one dimension.

[c20] 20. The system of claim 19 wherein the first and second substrates are releasably coupled together.

[c21] 21. The system of claim 19 wherein at least one of the first and second substrates is operatively coupleable to the output device via at least one cable.

[c22] 22. The system of claim 19 wherein the array includes a spherical array.

[c23] 23. The system of claim 19 wherein the array includes a two-dimensional rectilinear array.

[c24] 24. The system of claim 19 wherein the first and second substrates are positionable relative to each other in a first configuration that conforms to a first volume of space and positionable relative to each other in a second configuration that conforms to a second volume of space different than the first volume of space.

[c25] 25. The system of claim 19, further comprising a vehicle having an interior, the first and second substrates and the first and second acoustical transducers being positioned in the interior.

[c26] 26. An acoustical system, comprising:

a circuit board having a plurality of conductive paths, the circuit board being operatively coupleable to an output device; and
a plurality of microphones carried by the circuit board and positioned to form an array having at least one dimension, the microphones being configured to sense sound and to transmit input signals to the circuit board, the circuit board being configured to receive the input signals and to transmit at least one output signal to the output device.

[c27] 27. The system of claim 26 wherein the microphones include first microphones configured to transmit first input signals and the circuit board includes a first circuit board configured to transmit a first output signal, and wherein the system further comprises:

a second circuit board having a plurality of conductive paths, the second circuit board being coupled to the first circuit board and operatively coupleable to the output device or another output device; and
at least one second microphone carried by the second circuit board, the at least one second microphone being configured to sense sound and to transmit a second input signal to the second circuit board, the at least one second circuit board being configured to receive the second input signal and to transmit a second output signal to the output device or the other output device, and the first and second microphones being positioned in an array having at least one dimension.

[c28] 28. The system of claim 26 wherein the microphones include first microphones configured to transmit first input signals and the circuit board includes a first circuit board configured to transmit a first output signal, and wherein the system further comprises:

a second circuit board having a plurality of conductive paths, the second circuit board being coupled to the first circuit board and operatively coupleable to the output device or another output device, the first

and second substrates being positioned relative to each other in a first configuration that conforms to a first volume of space and positionable relative to each other in a second configuration that conforms to a second volume of space different than the first volume of space; and

at least one second microphone carried by the second circuit board, the at least one second microphone being configured to sense sound and to transmit a second input signal to the second circuit board, the at least one second circuit board being configured to receive the second input signal and to transmit a second output signal to the output device or the other output device, and the first and second microphones being positioned in an array having at least one dimension when the first and second substrates are positioned in the first and second configurations.

[c29] 29. The system of claim 26, further comprising a vehicle having an interior, the circuit board and the microphones being positioned in the interior.

[c30] 30. An acoustical method, comprising:
sensing sound with acoustical transducers carried by a substrate, wherein the acoustical transducers are positioned to form an array having at least one dimension;
transmitting input signals from the acoustical transducers to the substrate;
receiving the input signals at the substrate; and
transmitting at least one output signal from the substrate to an output device.

[c31] 31. The method of claim 30, further comprising processing the signals from the acoustical transducers with a processor carried by the substrate.

[c32] 32. The method of claim 30, further comprising using the output signal in an acoustical holographic process to produce a map of the sound proximate to the acoustical transducers.

[c33] 33. The method of claim 30, further comprising installing the substrate and the acoustical transducers in a vehicle.

[c34] 34. An acoustical method, comprising:
positioning a first substrate carrying at least one first acoustical transducer and a second substrate carrying at least one second acoustical transducer such that the first and second acoustical transducers form an array having at least one dimension;
sensing sound with the at least one first acoustical transducer;
transmitting a first input signal from the at least one first acoustical transducer to the first substrate;
receiving the first input signal at the first substrate;
transmitting at least one first output signal from the first substrate to an output device;
sensing sound with the at least one second acoustical transducer;
transmitting a second input signal from the at least one second acoustical transducer to the second substrate;
receiving the second input signal at the second substrate; and
transmitting at least one second output signal from the second substrate to the output device or another output device.

[c35] 35. The method of claim 34 wherein positioning the first and second substrates includes positioning the first and second substrates in a first configuration that conforms to a first volume of space, and wherein the method further comprises repositioning the first and second substrates in a second configuration that conforms to a second volume of space different than the first volume of space.

- [c36] 36. The method of claim 34, further comprising installing the first and second substrates and the first and second acoustical transducers in a vehicle.
- [c37] 37. A method for making an acoustical system comprising:
providing a substrate having a plurality of conductive paths;
carrying acoustical transducers with the substrate to form an array of acoustical transducers having at least one dimension, the acoustical transducers being configured to sense sound and to transmit input signals to the substrate; and
operatively coupling the acoustical transducers to one or more of the plurality of conductive paths.
- [c38] 38. The method of claim 37, further comprising installing the substrate and the acoustical transducers in a vehicle.
- [c39] 39. The method of claim 37, further comprising selecting an impedance and causing at least one of a location and size of at least one of the plurality of conductive paths of the substrate to at least approximately provide the impedance.
- [c40] 40. The method of claim 37, further comprising connecting at least one acoustical transducer to a connector carried by the substrate.
- [c41] 41. A method for making an acoustical system comprising:
providing a first substrate having a plurality of conductive paths;
carrying at least one first acoustical transducer with the substrate, the at least one first acoustical transducer being configured to sense sound and to transmit at least one first input signal to the substrate;
operatively coupling the at least one first acoustical transducer to one or more of the plurality of conductive paths of the first substrate;
providing a second substrate having a plurality of conductive paths;

carrying at least one second acoustical transducer with the substrate, the at least one second acoustical transducer being configured to sense sound and to transmit at least one second input signal to the substrate; and

operatively coupling the at least one second acoustical transducer to one or more of the plurality of conductive paths of the second substrate, and wherein the first and second substrates are configured to be coupled together to position the first and second acoustical transducers in an array having at least one dimension.

[c42] 42. The method of claim 41 wherein providing the first and second substrates includes providing first and second substrates that are configured to be releasably coupled together in a first configuration that conforms to a first volume of space and configured to be releasably coupled together in a second configuration that conforms to a second volume of space different than the first volume of space.

[c43] 43. The method of claim 41, further comprising:
selecting an impedance value; and
sizing, locating or sizing and locating at least one of the plurality of conductive paths of at least one of the first and second substrates to have at least approximately the impedance value.

[c44] 44. The method of claim 41, further comprising installing the first and second substrates and the first and second acoustical transducers in a vehicle.